Exhibit 7

U.S. Patent No. 7,588,828

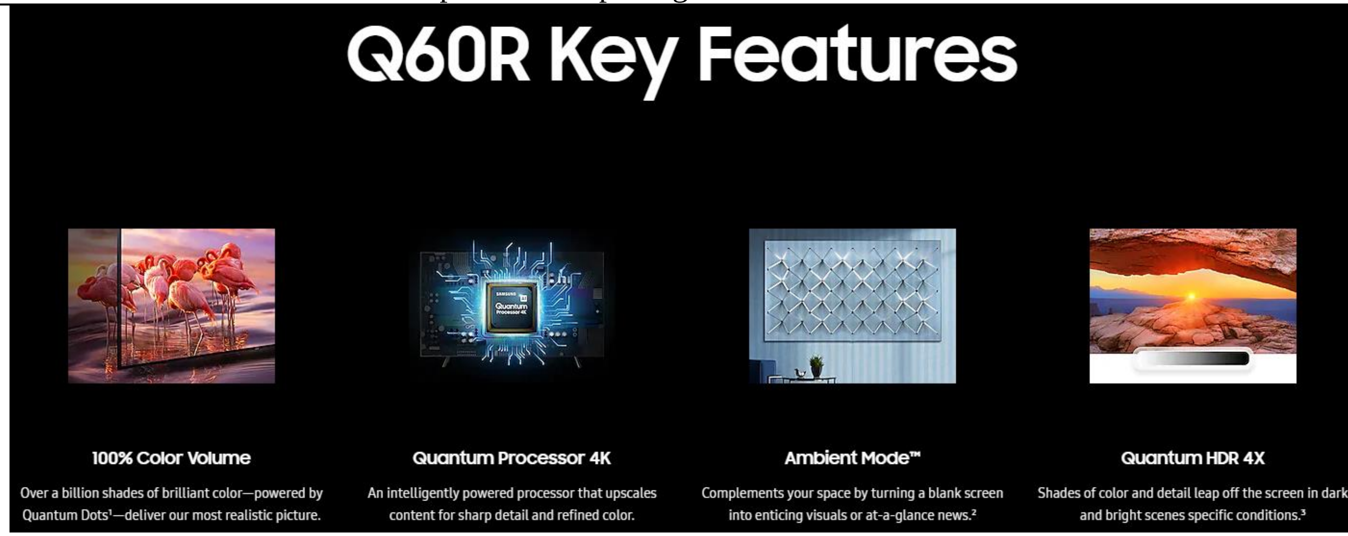
1. A nanoparticle comprising:	The Samsung Q60R QLED TV is an exemplary LED TV (the "Samsung TV") that includes nanoparticles.  For example, the Samsung TV includes quantum dots (the "Samsung Quantum Dots")[1].

[1] Upon information and belief, all Samsung QLED and QD-OLED TVs listed in Exhibit 6 include the same Quantum Dots. For example, Samsung QLED TV's display stack includes a Blue LED and layer of Quantum Dots in a Quantum Dot Layer.

See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (SAIT, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slides 11, 16.
see also e.g., https://www.techradar.com/news/samsung-qled-samsungs-latest-television-acronym-explained;
see also e.g., https://www.samsung.com/global/tv/blog/stained-glass-and-quantum-dot-technology/;
see also e.g., https://www.displaydaily.com/article/display-daily/future-of-quantum-dot-display-niche-or-mainstream;
see also e.g., https://www.techradar.com/news/samsung-qled-samsungs-latest-television-acronym-explained.

Samsung's QD-OLED TV displays operate in substantially the same way in that they are comprised of a Blue OLED and Quantum Dot layer.

See e.g., https://www.cnet.com/news/samsung-reportedly-working-on-quantum-dot-oled-tv-hybrid/.



See e.g., https://www.samsung.com/us/televisions-home-theater/tvs/qled-4k-tvs/43-class-q60-qled-smart-4k-uhd-tv-2019-qn43q60rafxza/.

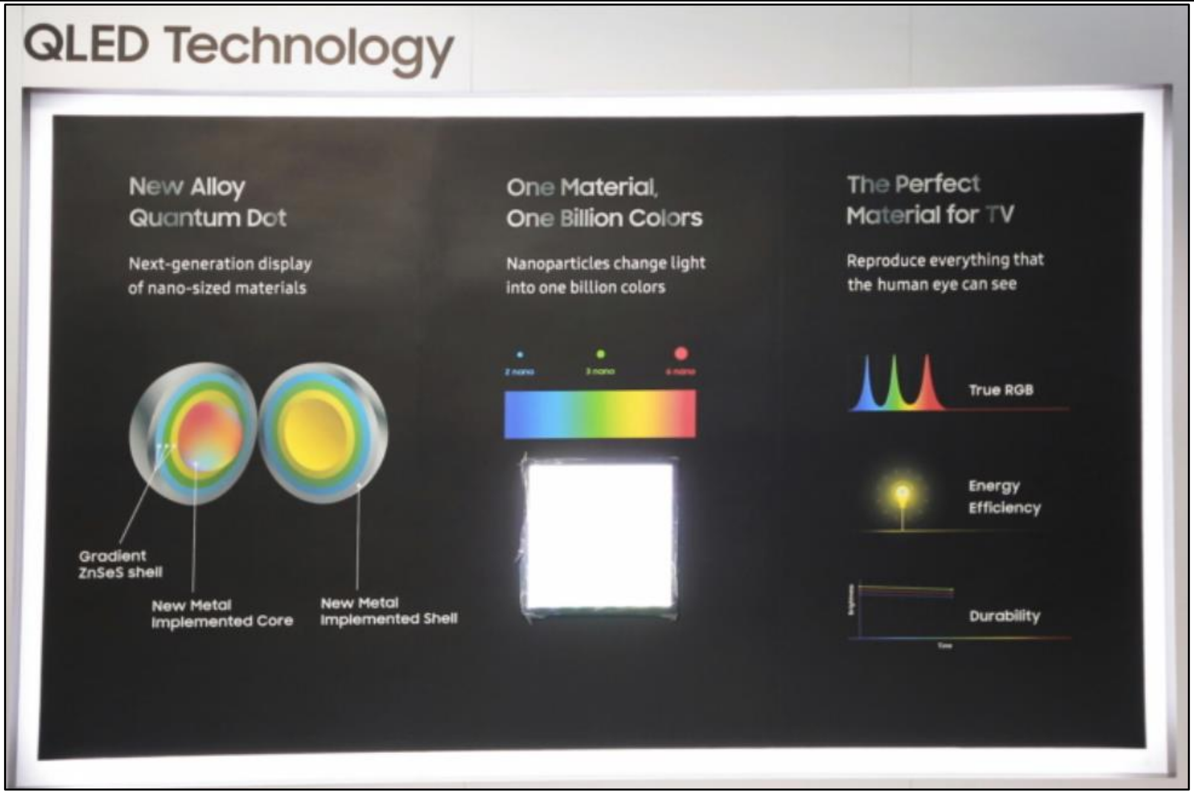
Quantum Dots

QLED displays true colors (over a billion shades to be exact), even in the brightest scenes with 100% Color Volume.[1] So whether you're watching survival shows that take place on secluded beaches or nature documentaries that explore every corner of the planet, you'll experience rich cinematic views that will make you feel like you're there.

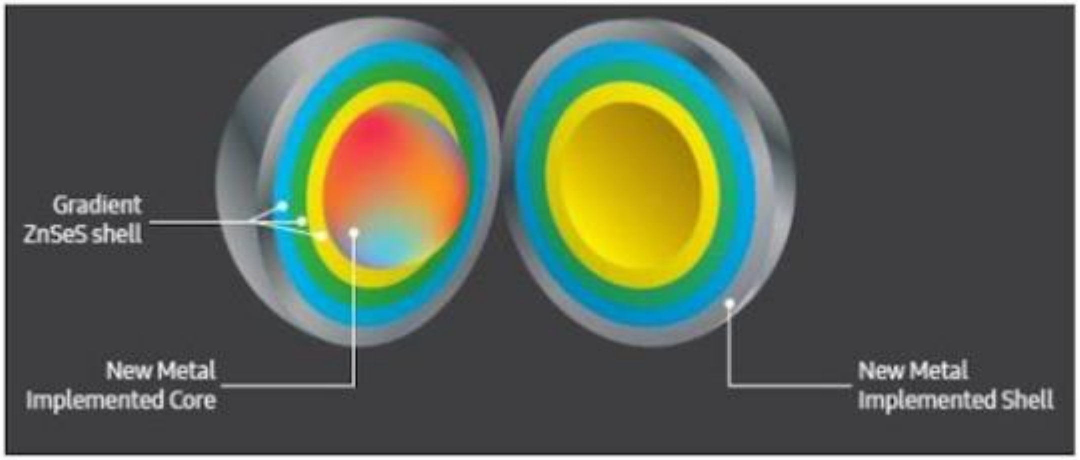
See e.g., https://www.samsung.com/us/televisions-home-theater/tvs/qled-tv/technology/.

The Samsung Quantum Dots used in the Samsung TV are nanoparticles.

"1. A nanoparticle comprising:"

	 *See e.g.*, https://news.samsung.com/global/how-qled-achieves-excellence-in-picture-quality; *See also e.g.*, https://www.hitechcentury.com/samsungs-next-gen-qled-tv-showcased-at-sea-forum-2017/;

"1. A nanoparticle comprising:"



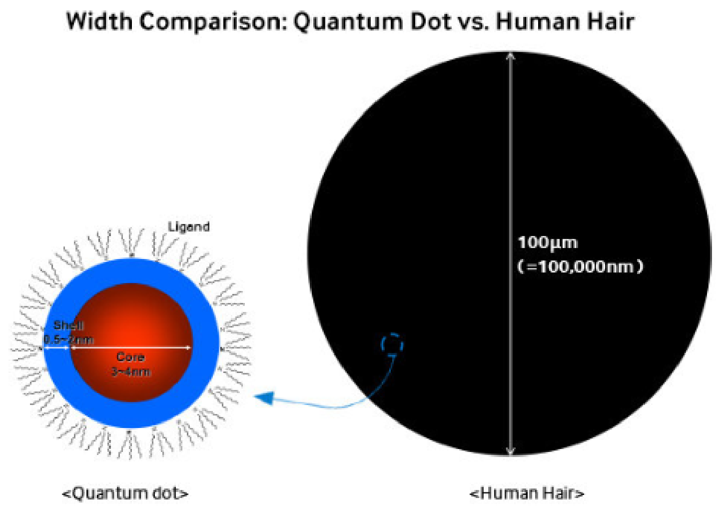
A diagram showing the unique Quantum Dot design Samsung is using in its 2017 QLED TVs.

PHOTO: SAMSUNG

See e.g., https://www.forbes.com/sites/johnarcher/2017/09/19/what-is-qled-and-why-does-it-matter/#732982817fb3

What Is 'Quantum Dot?'

Quantum dots are nano-sized crystals made of semiconductor materials. A nanometer (nm) is one billionth of a meter, which means these extra-small particles are smaller than 1/10,000 of a single strand of human hair.*

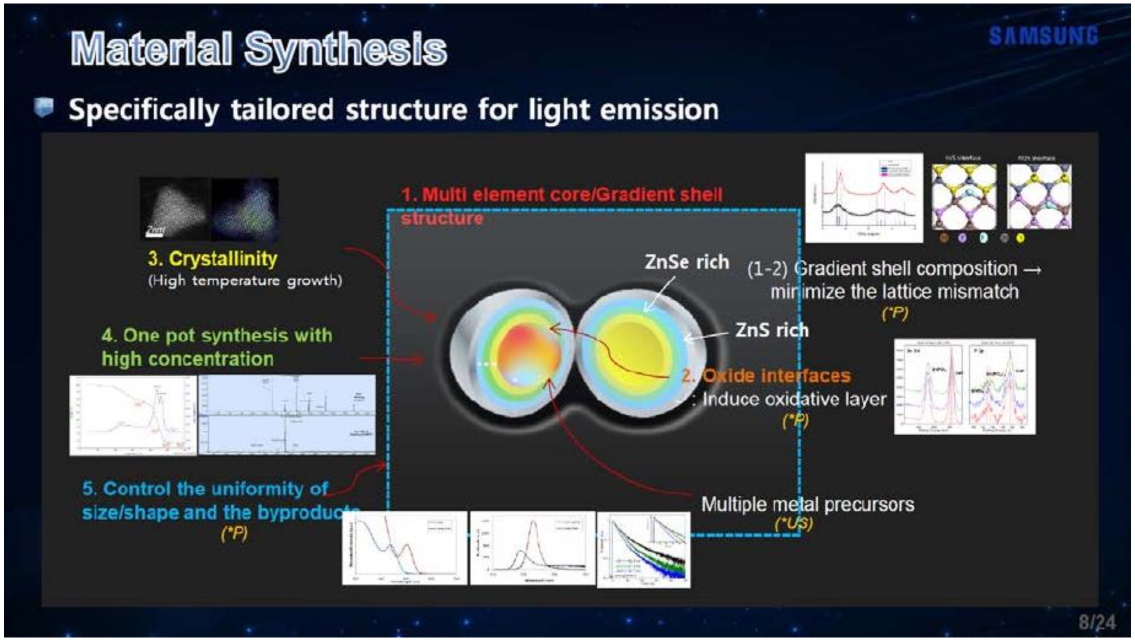


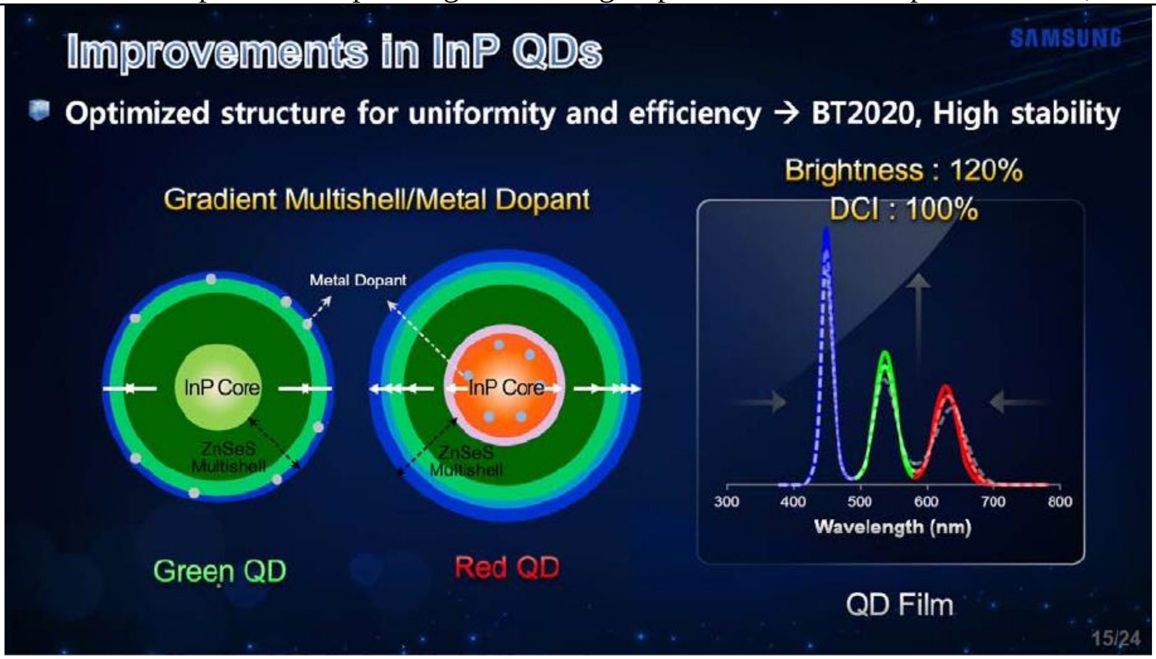
Quantum dots can be made of different kinds of elements, but when they're regulated down to a size small enough, they possess physical properties that make them suitable for many different applications. For example, quantum dots are very efficient in absorbing and then emitting light. Based on this quality, quantum dots are being researched in areas such as solar panels, bioimaging, and, of course, display.

See e.g., https://news.samsung.com/za/why-are-quantum-dot-displays-so-good.

	What the what? Quantum dots are microscopic nanocrystals that glow a specific wavelength (i.e. color) when given energy. The exact color produced by the QD depends on its size: larger for longer wavelengths (redder colors), smaller for shorter wavelengths (bluer). That's a bit of an oversimplification, but that's the basic idea. Specific wavelengths of color is what we need to great an image on a television. Using the three primary colors of red, green, and blue, we can mix a full rainbow of teals, oranges, yellows, and more. *See e.g.*, https://www.cnet.com/news/quantum-dots-how-nanocrystals-can-make-lcd-tvs-better/.

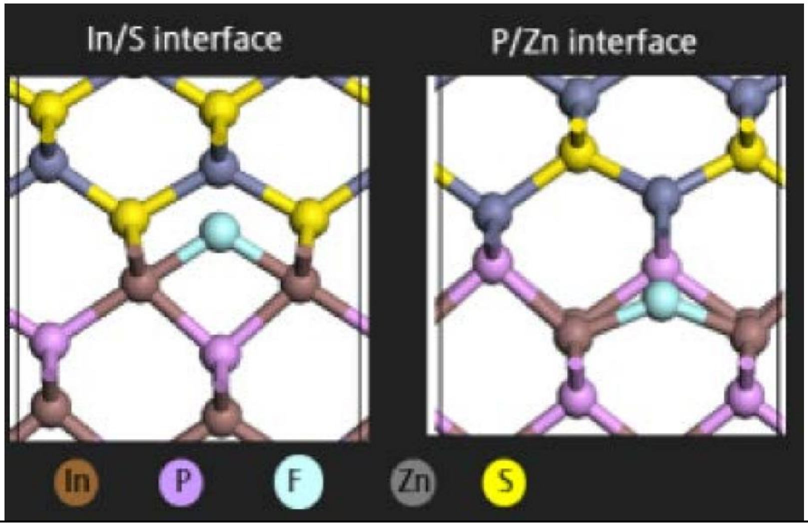
"(i) a molecular cluster compound incorporating ions from groups 12 and 16 of the periodic table, and"

(i) a molecular cluster compound incorporating ions from groups 12 and 16 of the periodic table, and	The Samsung Quantum Dots include a molecular cluster compound incorporating ions from groups 12 and 16 of the periodic table. For example, the Samsung Quantum Dots include an InP core that is surrounded by an oxide layer and two Zn-based outer shells. 



See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slides 8, 15.

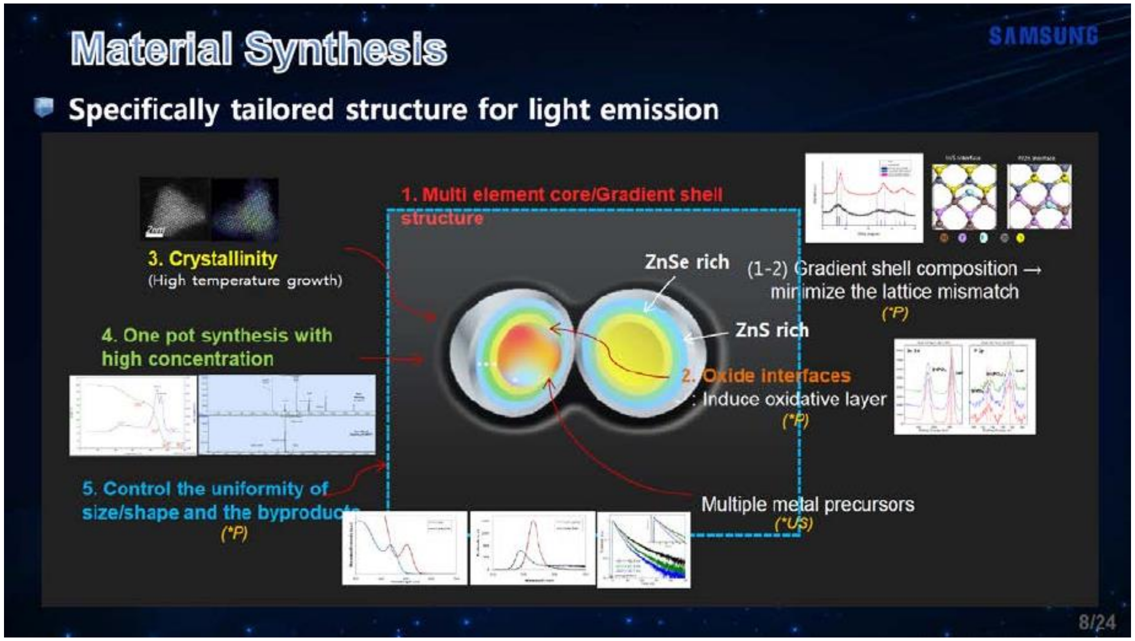
Samsung demonstrates that a molecular interface exists between In, P, Zn, and S within their Quantum Dot cores.



"(i) a molecular cluster compound incorporating ions from groups 12 and 16 of the periodic table, and"

See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.

The interface between In, P, Zn, and S must reside within the InP core since the InP core is surrounded by an oxide layer—separating it from the ZnS and ZnSe outer shells.

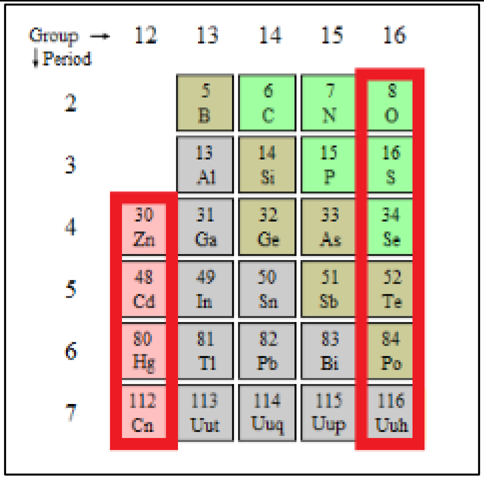


See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.

This means that the InP core is formed on a molecular cluster compound including, at least, Zn and S, which are ions from groups 12 and 16.

For example, S is an ions from group 16 of the periodic table. Group 16 elements include: O, S, Se, Te, Po, and Uuh. Further, Zn is an ion from group 12 of the periodic table. Group 12 elements include: Zn, Cd, Hg, and Cn.

"(i) a molecular cluster compound incorporating ions from groups 12 and 16 of the periodic table, and"

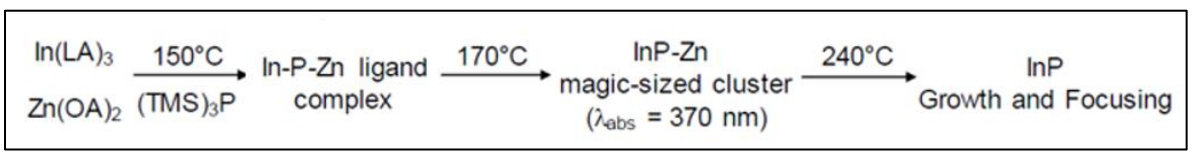


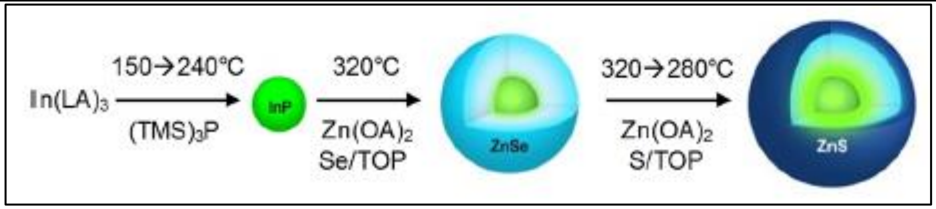
See e.g., https://www.jobilize.com/nanotechnology/course/optical-properties-of-group-12-16-ii-vi-semiconductor-nanoparticles.

Further, upon information and belief, Samsung's Quantum Dots are formed using the following synthesis process, which uses a molecular cluster compound incorporating ions from groups 12 and 16 of the periodic table.

"We injected $(TMS)_3P$ at 150 °C in the presence of both indium laurate $(In(LA)_3)$ and zinc oleate $(Zn(OA)_2)$ precursors. At this mild temperature the In − P − Zn ligand complexes were first formed, and then they were converted to InP MSCs as the temperature increased to 170 °C, showing a sharp absorption peak at 370 nm."

See e.g., "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics) (Exhibit 13), at 1497.





Id., *see also e.g.*, “Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays,” ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics), Supporting Information (Exhibit 14) at S-3.

For example, O is an ions from group 16 of the periodic table. Group 16 elements include: O, S, Se, Te, Po, and Uuh. Further, Zn is an ion from group 12 of the periodic table. Group 12 elements include: Zn, Cd, Hg, and Cn.

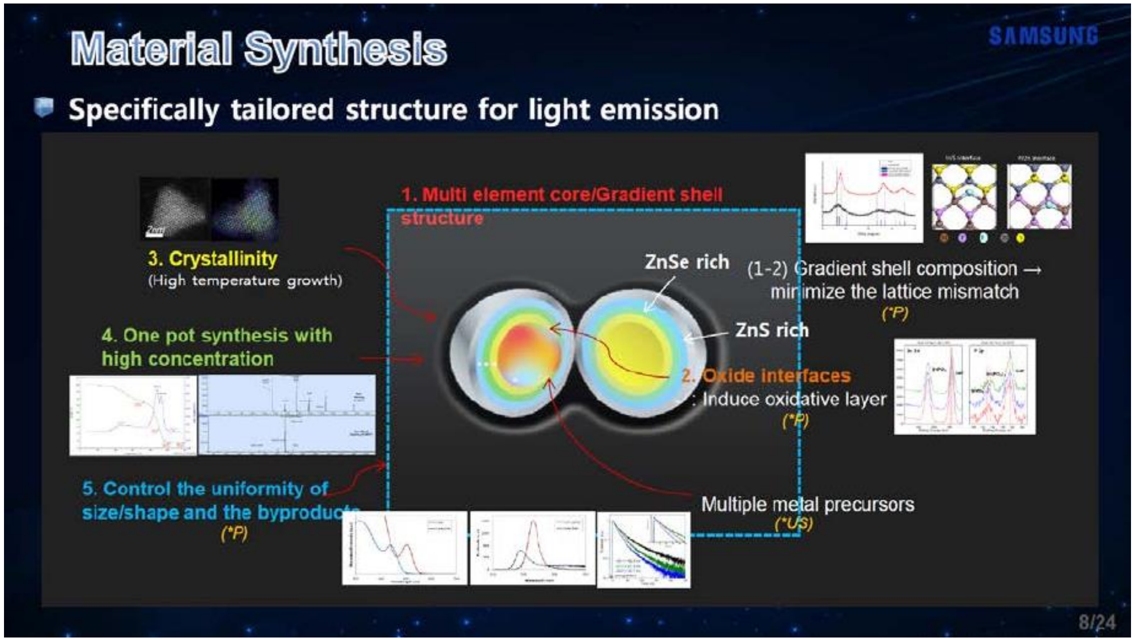
Group → / ↓ Period	12	13	14	15	16
2		5 B	6 C	7 N	8 O
3		13 Al	14 Si	15 P	16 S
4	30 Zn	31 Ga	32 Ge	33 As	34 Se
5	48 Cd	49 In	50 Sn	51 Sb	52 Te
6	80 Hg	81 Tl	82 Pb	83 Bi	84 Po
7	112 Cn	113 Uut	114 Uuq	115 Uup	116 Uuh

See e.g., https://www.jobilize.com/nanotechnology/course/optical-properties-of-group-12-16-ii-vi-semiconductor-nanoparticles.

"(ii) a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table."

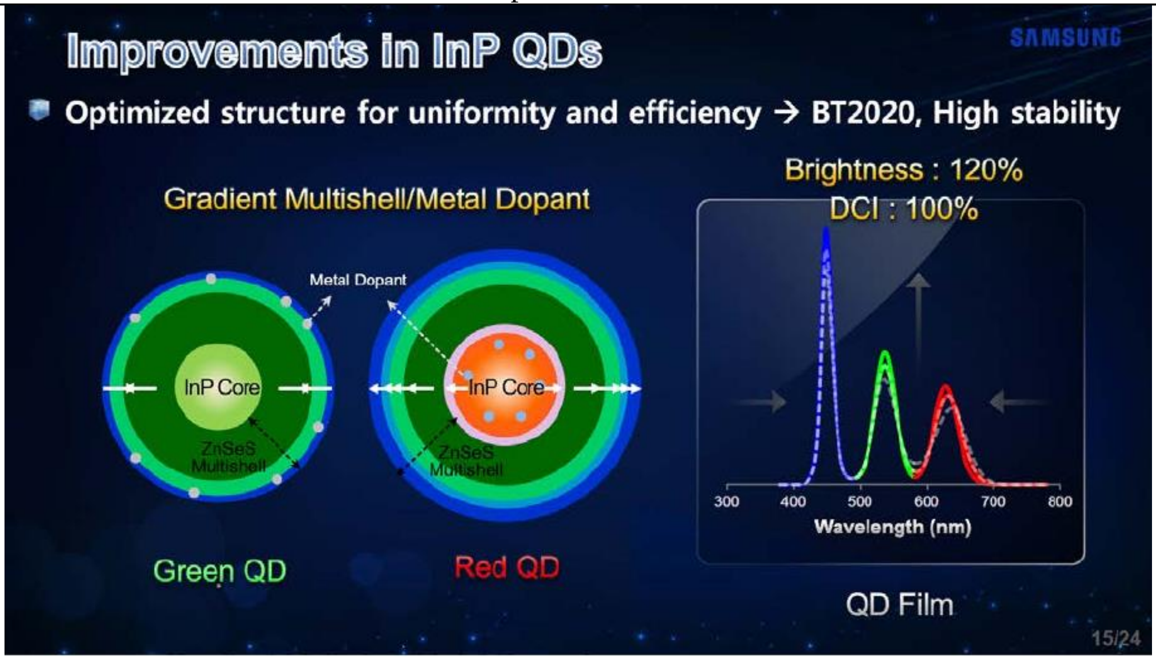
<table>
<tr>
<td>(ii) a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table.</td>
<td>The Samsung Quantum Dots include a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table.

For example, the Samsung Quantum Dots include an InP core that is surrounded by an oxide layer and two Zn-based outer shells.

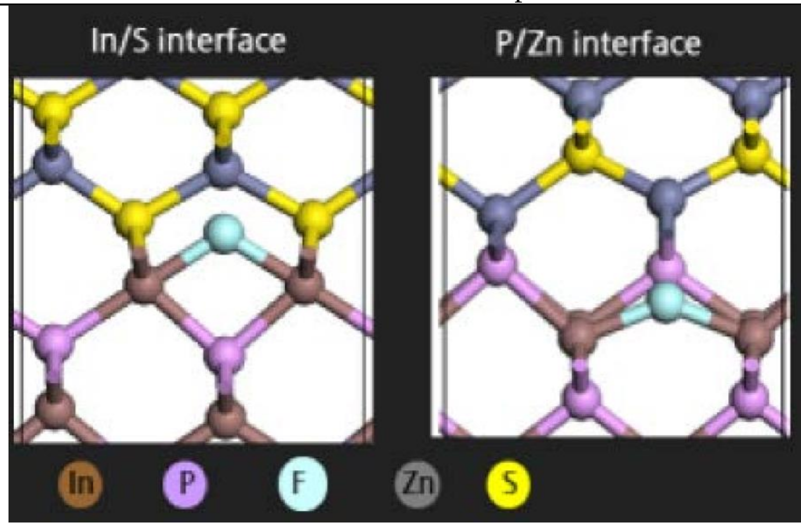


</td>
</tr>
</table>

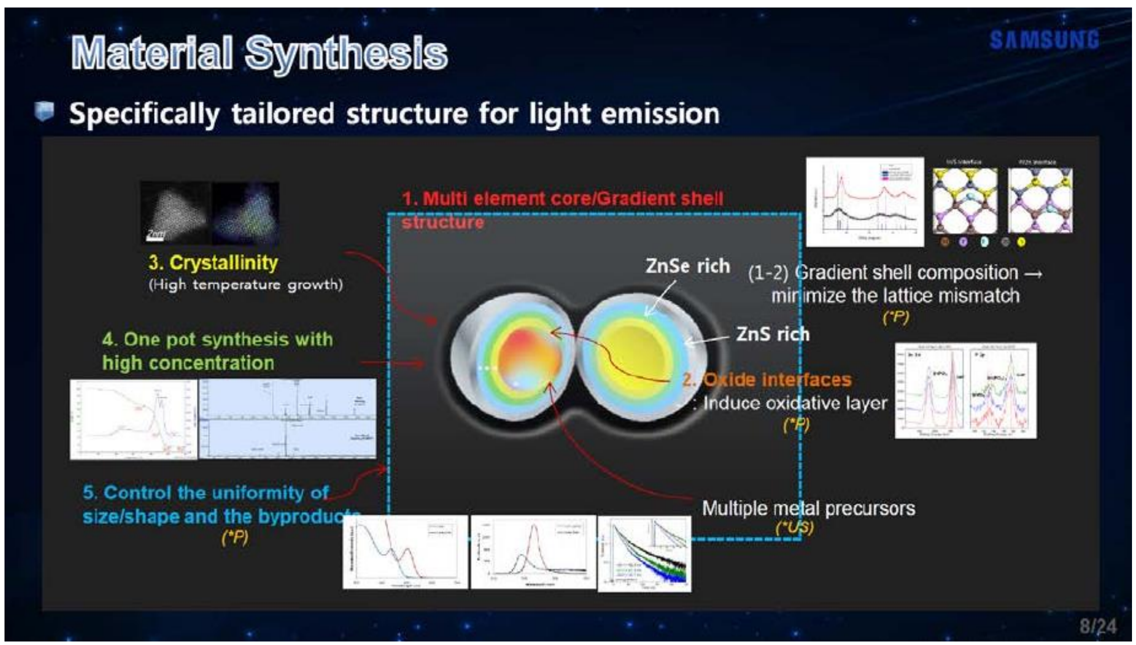
"(ii) a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table."

	 *See e.g.*, "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slides 8, 15. The InP semiconductor core is provided on the molecular cluster compound. As shown previously, Samsung demonstrates that a molecular interface, within the nanoparticle core, exists between In, P, Zn, and S within their InP Quantum Dot cores.

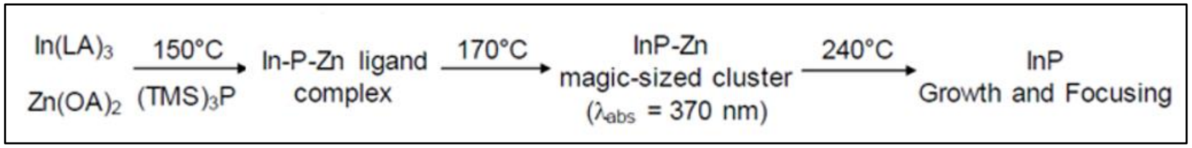
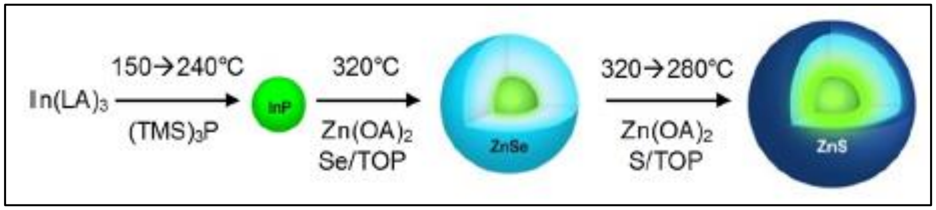
"(ii) a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table."



See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.



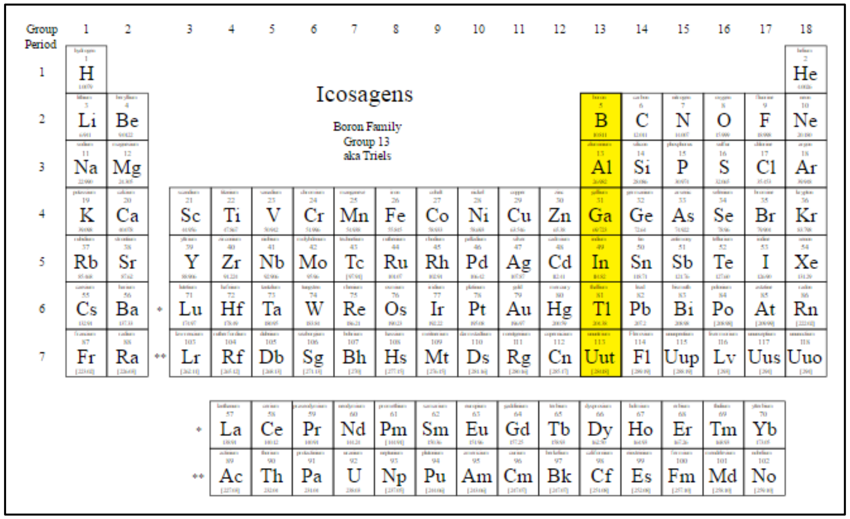
"(ii) a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table."

	See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8. Further, upon information and belief, Samsung's Quantum Dots are formed using the following synthesis process, which includes a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table. **"We injected $(TMS)_3P$ at 150 °C in the presence of both indium laurate $(In(LA)_3)$ and zinc oleate $(Zn(OA)_2)$ precursors. At this mild temperature the In − P − Zn ligand complexes were first formed, and then they were converted to InP MSCs as the temperature increased to 170 °C, showing a sharp absorption peak at 370 nm."** *See e.g.*, "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics) (Exhibit 13), at 1497.   *Id., see also e.g.*, "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics), Supporting Information (Exhibit 14) at S-3. Samsung's Quantum Dot synthesis process demonstrates that, at least, $In(LA)_3$ and $(TMS)_3P$ are provided on a molecular cluster.

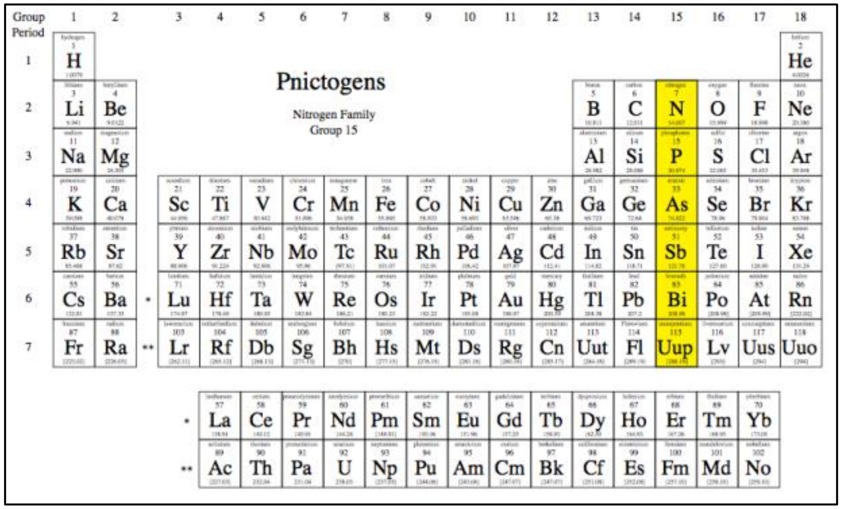
U.S. Patent No. 7,588,828: Claim 1

"(ii) a core semiconductor material provided on said molecular cluster compound, wherein the core semiconductor material incorporates ions from groups 13 and 15 of the periodic table."

The InP semiconductor core in the Samsung Quantum Dots includes ions from groups 13 and 15 of the periodic table. Group 13 elements include: B, Al, Ga, In, Tl, and Uut. Group 15 elements include: N, P, As, Sb, Bi, and Uup.



See e.g., https://www.askiitians.com/iit-jee-s-and-p-block-elements/boron-family.html.



See e.g., https://periodictableprojectblog.wordpress.com/2016/02/14/group-15/.

"14. A method of producing nanoparticles, the method comprising the steps of:"

14. A method of producing nanoparticles, the method comprising the steps of:	The Samsung Q60R QLED TV is an exemplary LED TV (the "Samsung TV") that includes nanoparticles.  For example, the Samsung TV includes quantum dots (the "Samsung Quantum Dots")[2].

[2] Upon information and belief, all Samsung QLED TVs listed in Exhibit 6 include the same Quantum Dots. For example, Samsung QLED TV's display stack includes a Blue LED and layer of Quantum Dots in a Quantum Dot Layer.

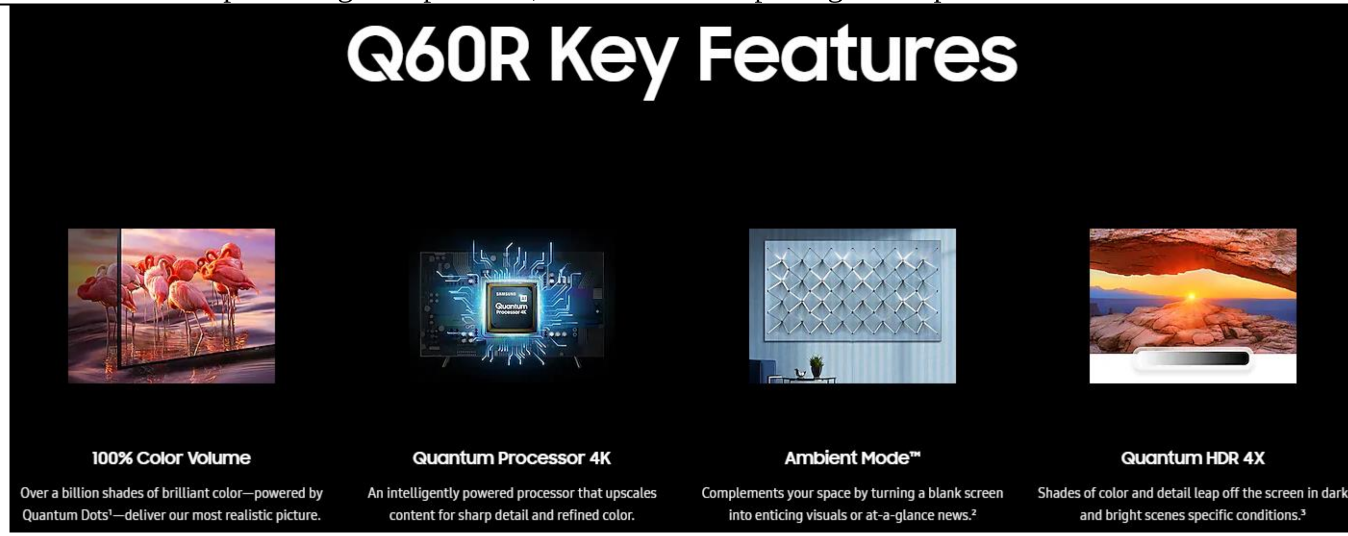
See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (SAIT, Samsung Electronics), Quantum Dot Forum 2018 Presentation at Slides 11, 16.
see also e.g., https://www.techradar.com/news/samsung-qled-samsungs-latest-television-acronym-explained;
see also e.g., https://www.samsung.com/global/tv/blog/stained-glass-and-quantum-dot-technology/;
see also e.g., https://www.displaydaily.com/article/display-daily/future-of-quantum-dot-display-niche-or-mainstream;
see also e.g., https://www.techradar.com/news/samsung-qled-samsungs-latest-television-acronym-explained.

Samsung's QD-OLED TV displays operate in substantially the same way in that they are comprised of a Blue OLED and Quantum Dot layer.

See e.g., https://www.cnet.com/news/samsung-reportedly-working-on-quantum-dot-oled-tv-hybrid/.

U.S. Patent No. 7,588,828: Claim 14

"14. A method of producing nanoparticles, the method comprising the steps of:"



See e.g., https://www.samsung.com/us/televisions-home-theater/tvs/qled-4k-tvs/43-class-q60-qled-smart-4k-uhd-tv-2019-qn43q60rafxza/.

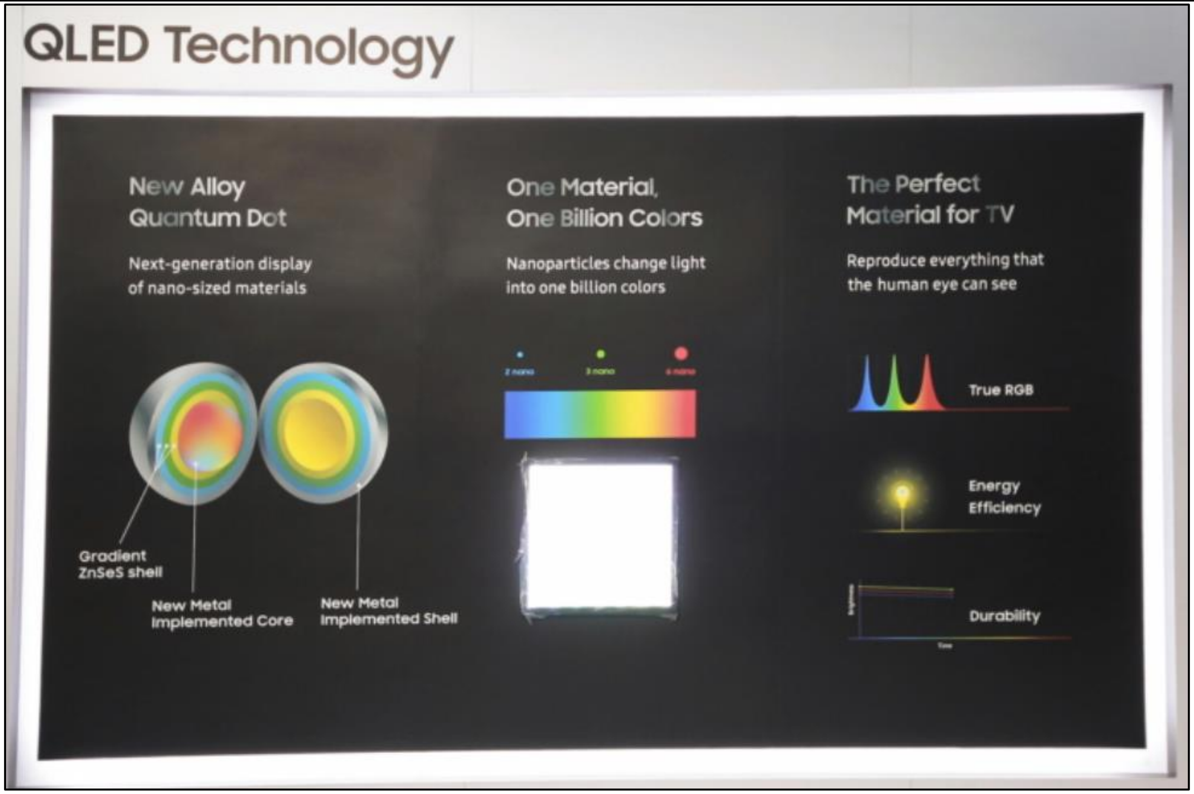
Quantum Dots

QLED displays true colors (over a billion shades to be exact), even in the brightest scenes with 100% Color Volume.[1] So whether you're watching survival shows that take place on secluded beaches or nature documentaries that explore every corner of the planet, you'll experience rich cinematic views that will make you feel like you're there.

See e.g., https://www.samsung.com/us/televisions-home-theater/tvs/qled-tv/technology/.

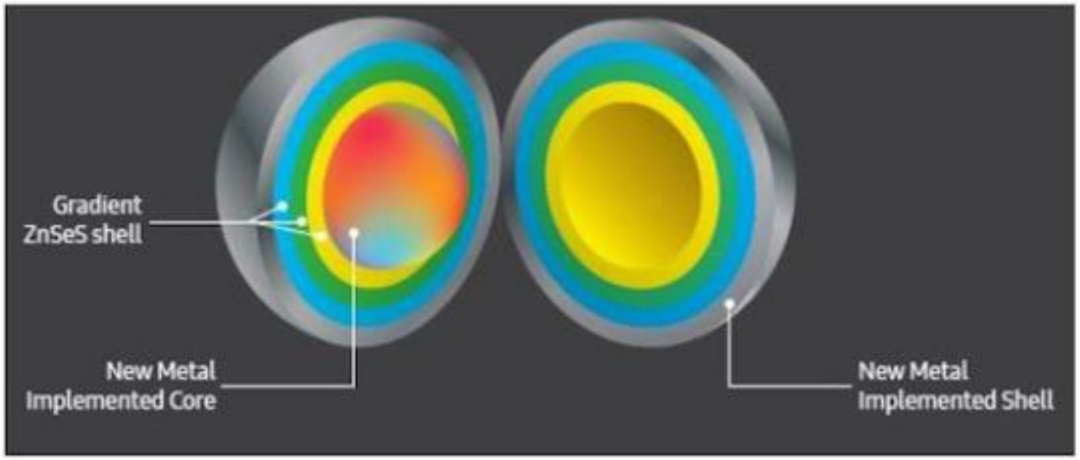
The Samsung Quantum Dots used in the Samsung TV are nanoparticles.

"14. A method of producing nanoparticles, the method comprising the steps of:"

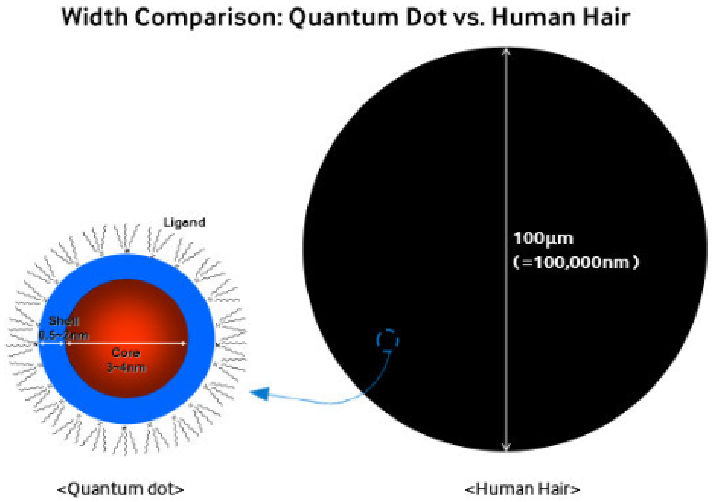


See e.g., https://news.samsung.com/global/how-qled-achieves-excellence-in-picture-quality;
See also e.g., https://www.hitechcentury.com/samsungs-next-gen-qled-tv-showcased-at-sea-forum-2017/;

"14. A method of producing nanoparticles, the method comprising the steps of:"

	 A diagram showing the unique Quantum Dot design Samsung is using in its 2017 QLED TVs. PHOTO: SAMSUNG *See e.g.*, https://www.forbes.com/sites/johnarcher/2017/09/19/what-is-qled-and-why-does-it-matter/#732982817fb3

"14. A method of producing nanoparticles, the method comprising the steps of:"

	What Is 'Quantum Dot?' Quantum dots are nano-sized crystals made of semiconductor materials. A nanometer (nm) is one billionth of a meter, which means these extra-small particles are smaller than 1/10,000 of a single strand of human hair.*  Quantum dots can be made of different kinds of elements, but when they're regulated down to a size small enough, they possess physical properties that make them suitable for many different applications. For example, quantum dots are very efficient in absorbing and then emitting light. Based on this quality, quantum dots are being researched in areas such as solar panels, bioimaging, and, of course, display. *See e.g.*, https://news.samsung.com/za/why-are-quantum-dot-displays-so-good.

"14. A method of producing nanoparticles, the method comprising the steps of:"

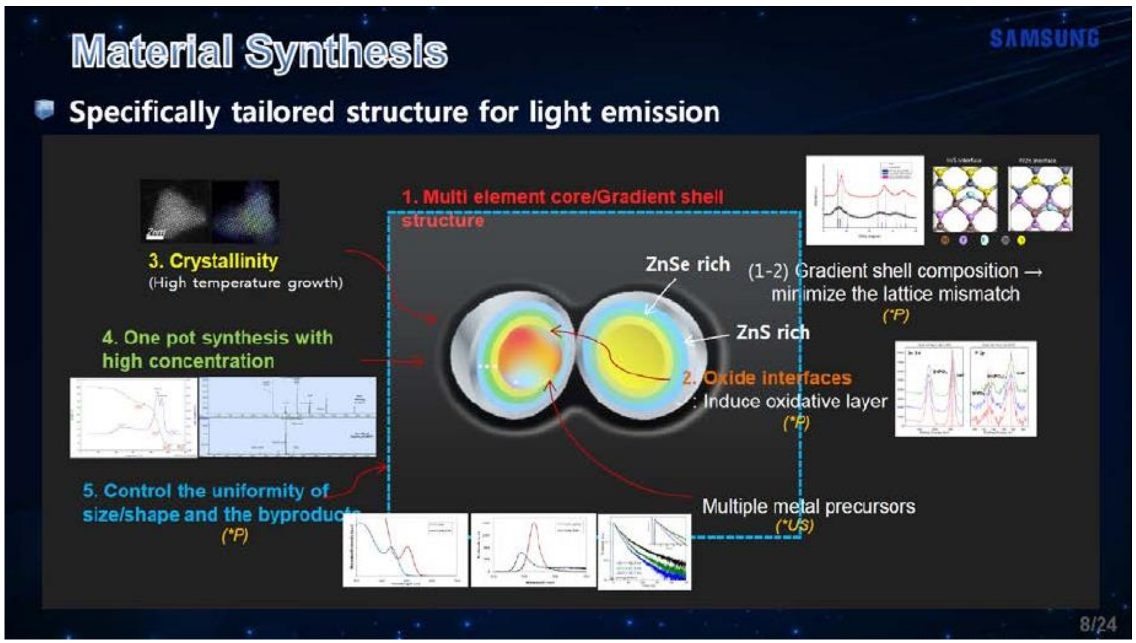
What the what?

Quantum dots are microscopic nanocrystals that glow a specific wavelength (i.e. color) when given energy. The exact color produced by the QD depends on its size: larger for longer wavelengths (redder colors), smaller for shorter wavelengths (bluer). That's a bit of an oversimplification, but that's the basic idea.

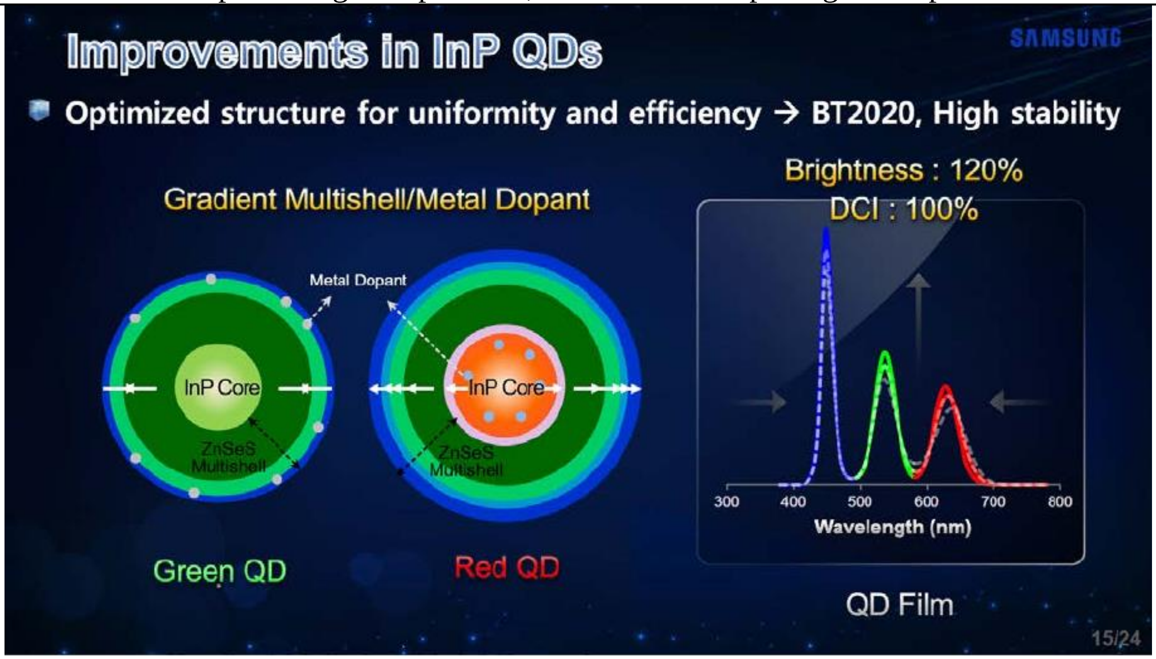
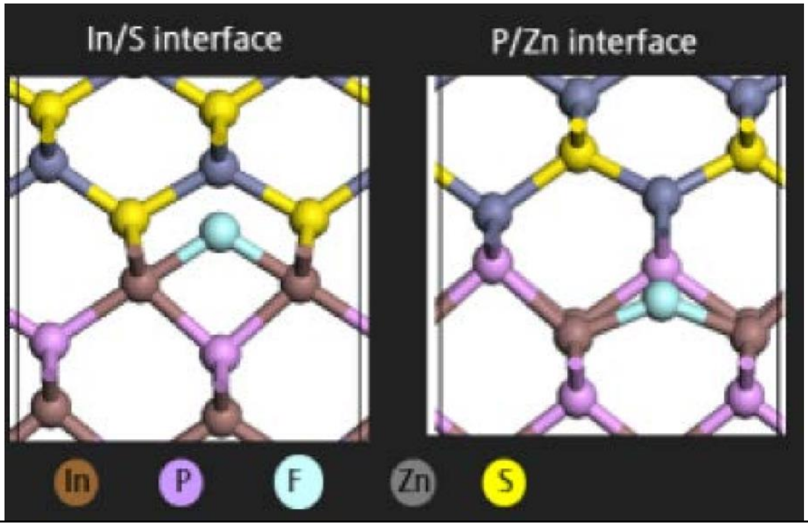
Specific wavelengths of color is what we need to great an image on a television. Using the three primary colors of red, green, and blue, we can mix a full rainbow of teals, oranges, yellows, and more.

See e.g., https://www.cnet.com/news/quantum-dots-how-nanocrystals-can-make-lcd-tvs-better/.

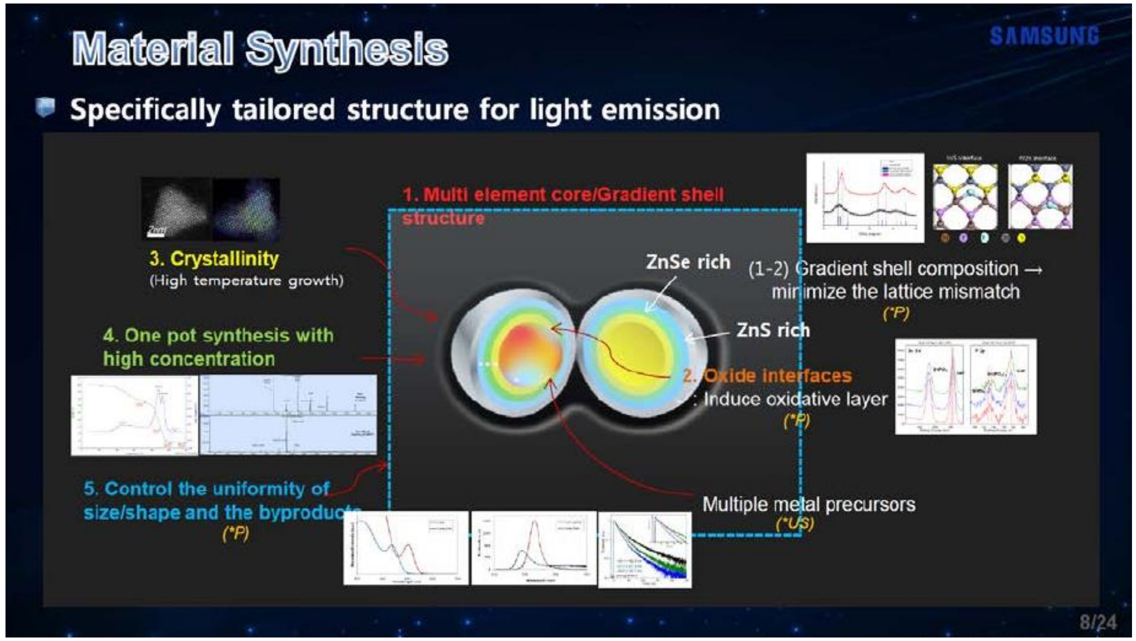
Samsung's Quantum Dots include an InP-based core, a first ZnSe shell, and a second ZnS shell.



"14. A method of producing nanoparticles, the method comprising the steps of:"

	 *See e.g.*, "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slides 8, 15. Samsung demonstrates that a molecular interface exists between In, P, Zn, and S within their Quantum Dot cores. 

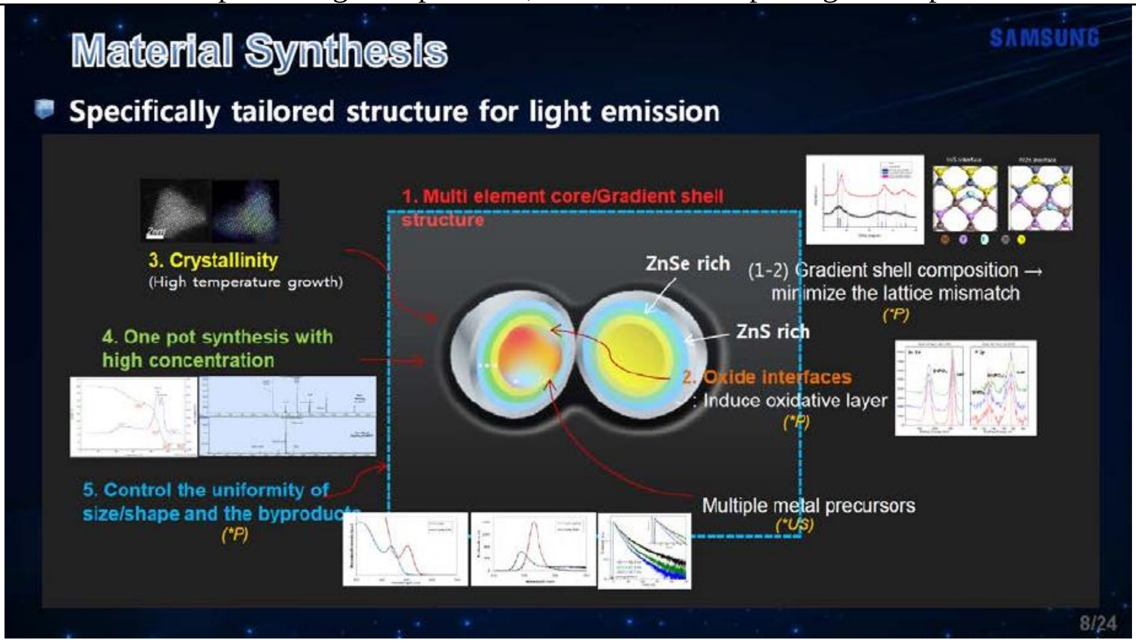
"14. A method of producing nanoparticles, the method comprising the steps of:"



See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.

Samsung's Quantum Dots are produced using a method. For example, Samsung discloses the use of a "one pot synthesis with high concentration" to make Quantum Dots.

"14. A method of producing nanoparticles, the method comprising the steps of:"

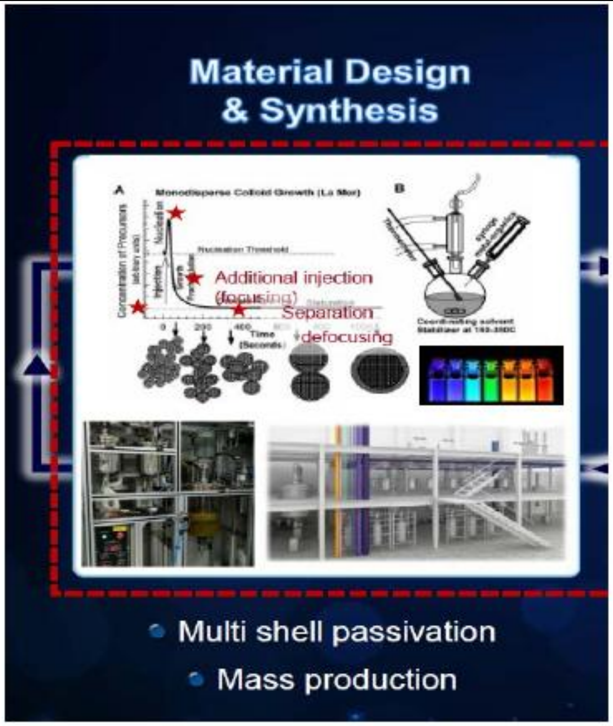


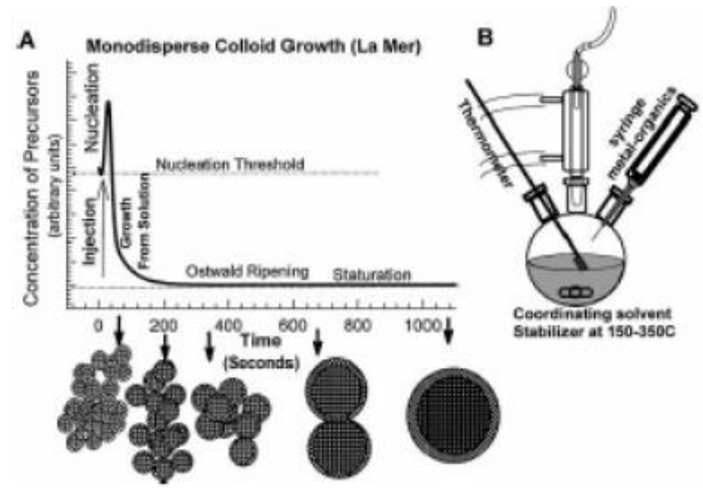
See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.

Further, Samsung depicts a lab scale reaction setup for Quantum Dot synthesis and the injection of metal-organics ("nanoparticle precursor composition").

U.S. Patent No. 7,588,828: Claim 14

"14. A method of producing nanoparticles, the method comprising the steps of:"

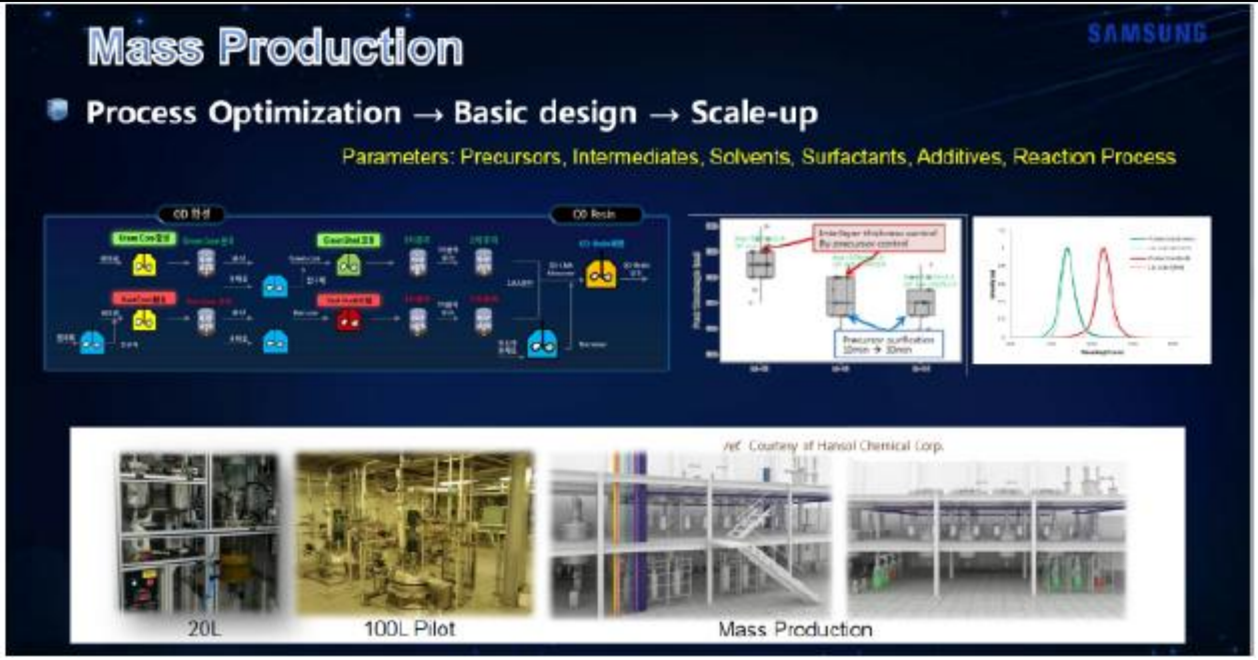




See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 13.

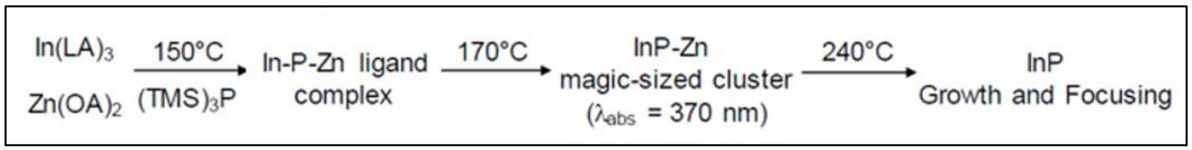
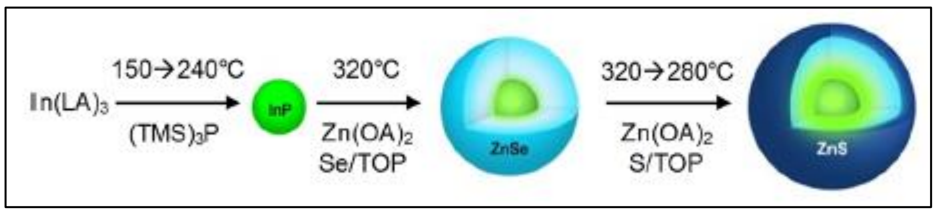
Further, Samsung discloses various large scale and mass production reaction setups for Quantum Dot synthesis.

"14. A method of producing nanoparticles, the method comprising the steps of:"

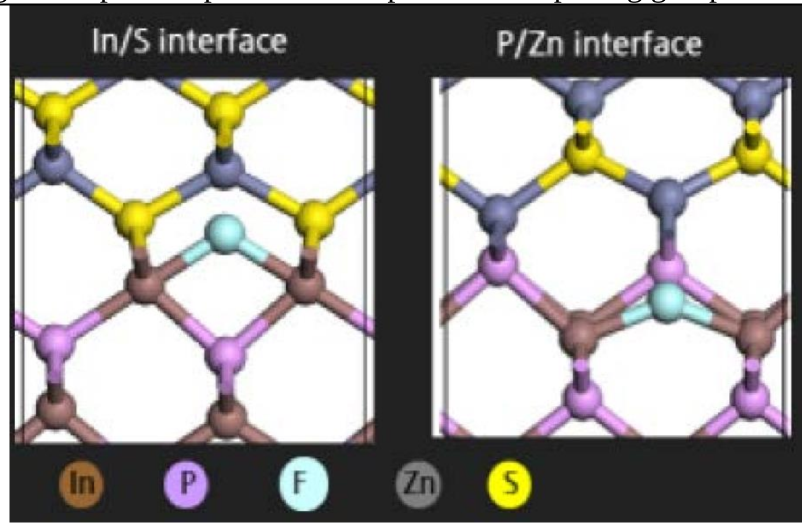


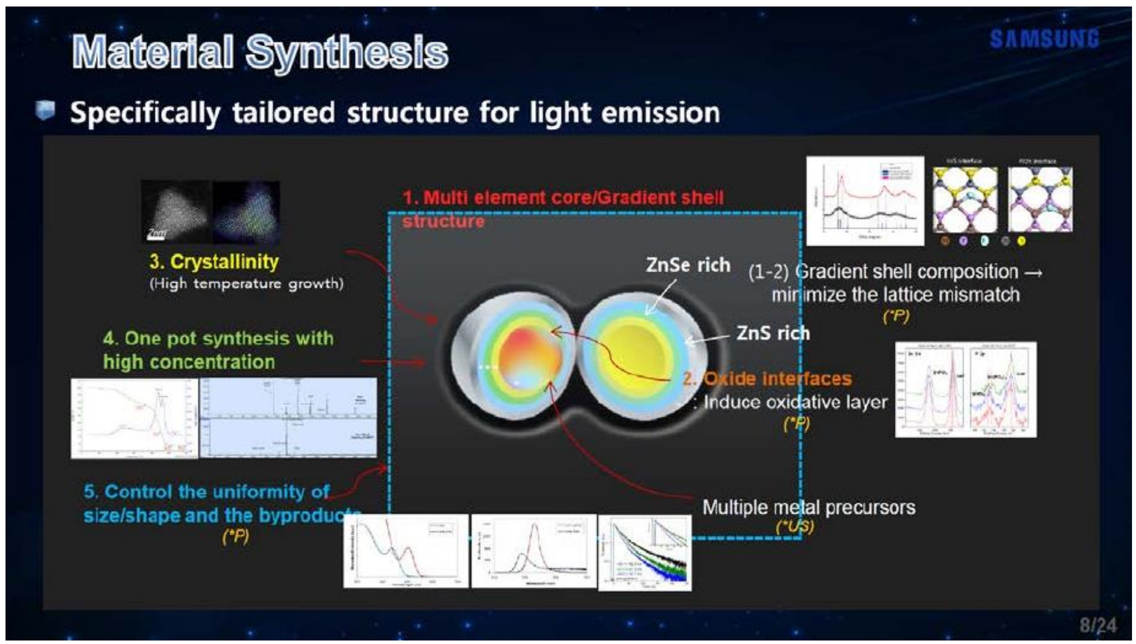
See e.g., “Environmentally Friendly Quantum Dots for Display Applications,” Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 10.

"providing a nanoparticle precursor composition comprising group 13 ions and group 15 ions; and"

providing a nanoparticle precursor composition comprising group 13 ions and group 15 ions; and	The method used to synthesize the Samsung Quantum Dots provides a nanoparticle precursor composition comprising group 13 and group 15 ions. For example, upon information and belief, Samsung's Quantum Dots are formed using the following synthesis process, which converts a nanoparticle precursor composition to a material of the nanoparticles: **"We injected $(TMS)_3P$ at 150 °C in the presence of both indium laurate ($In(LA)_3$) and zinc oleate ($Zn(OA)_2$) precursors. At this mild temperature the In − P − Zn ligand complexes were first formed, and then they were converted to InP MSCs as the temperature increased to 170 °C, showing a sharp absorption peak at 370 nm."** *See e.g.*, "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics) (Exhibit 13), at 1497.   *Id., see also e.g.*, "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics), Supporting Information (Exhibit 14) at S-3. Samsung's Quantum Dot synthesis process demonstrates that, at least, $In(LA)_3$ and $(TMS)_3P$ are precursor species comprised of ions contained in Samsung's resulting Quantum Dot nanoparticle core. *Id.* Samsung also demonstrates that a molecular interface exists between In, P, Zn, F, and S within their Quantum Dot cores, which means that precursor species containing, at least, In, P, Zn, and S are used in the synthesis process.

"providing a nanoparticle precursor composition comprising group 13 ions and group 15 ions; and"

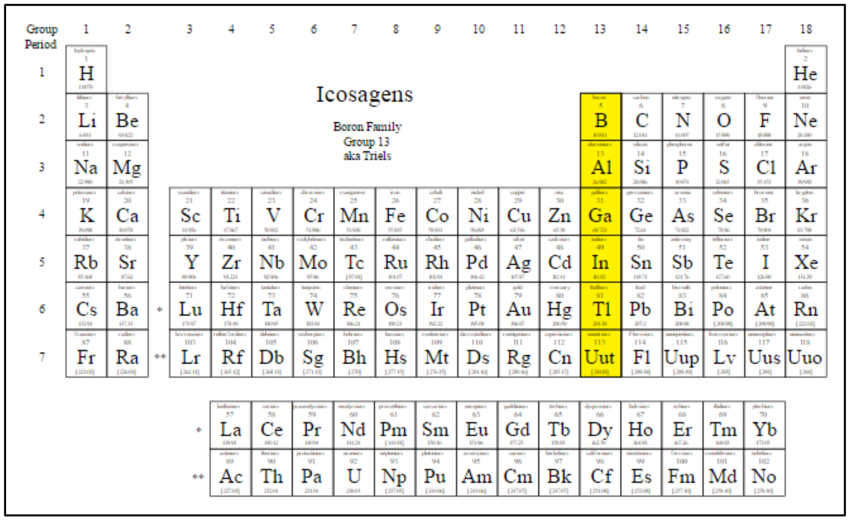




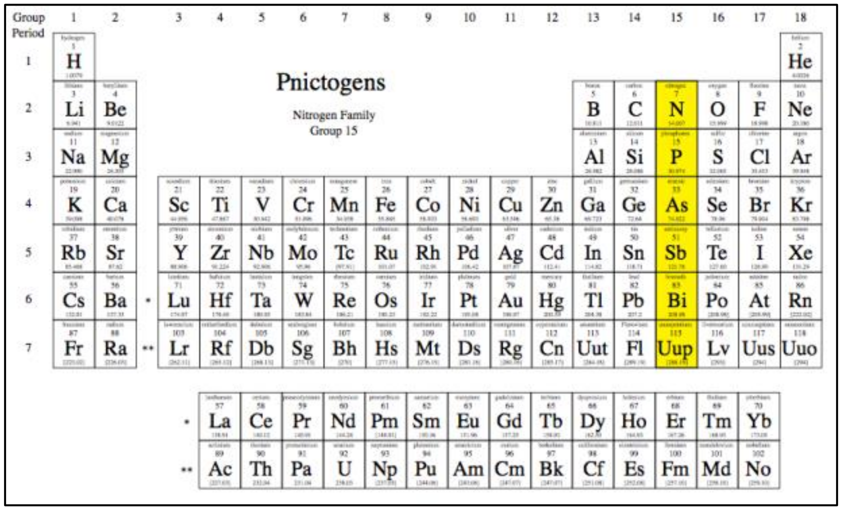
See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.

Samsung's precursor composition includes ions from groups 13 and 15 of the periodic table. Group 13 elements include: B, Al, Ga, In, Tl, and Uut. Group 15 elements include: N, P, As, Sb, Bi, and Uup.

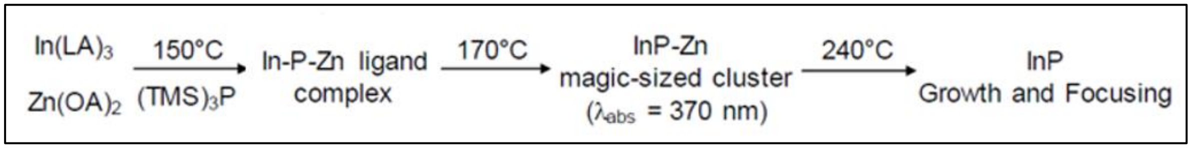
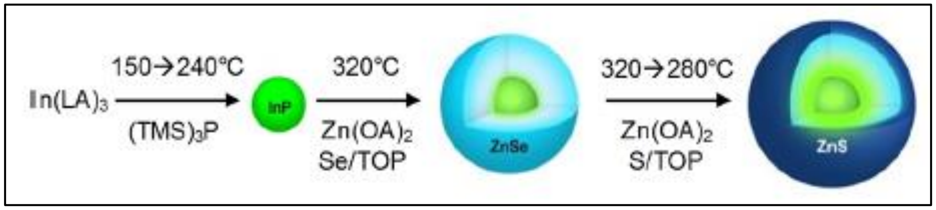
"providing a nanoparticle precursor composition comprising group 13 ions and group 15 ions; and"



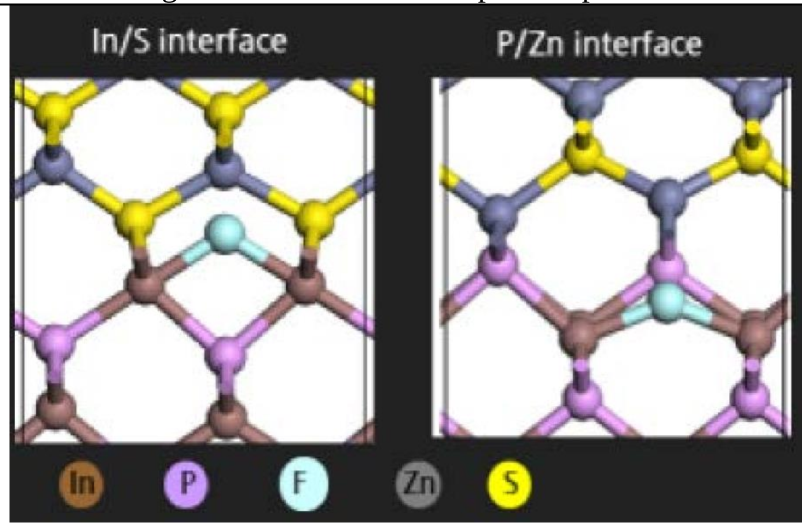
See e.g., https://www.askiitians.com/iit-jee-s-and-p-block-elements/boron-family.html.

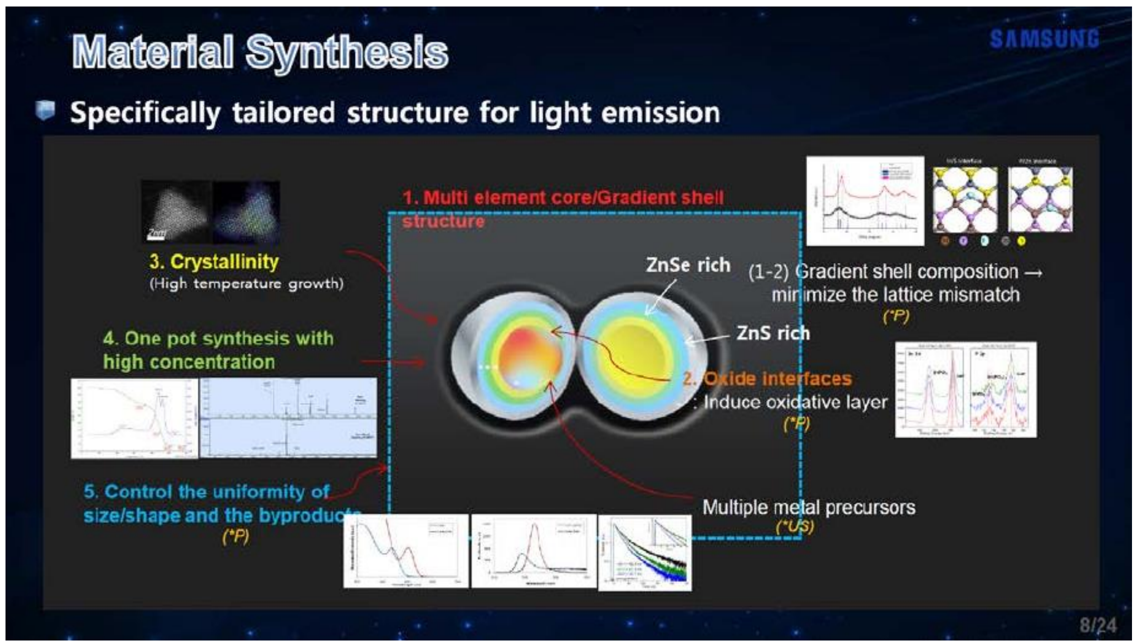


See e.g., https://periodictableprojectblog.wordpress.com/2016/02/14/group-15/.

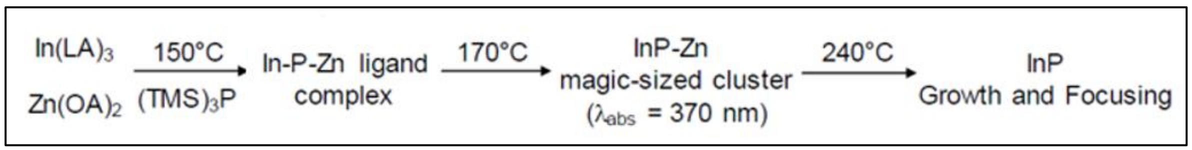
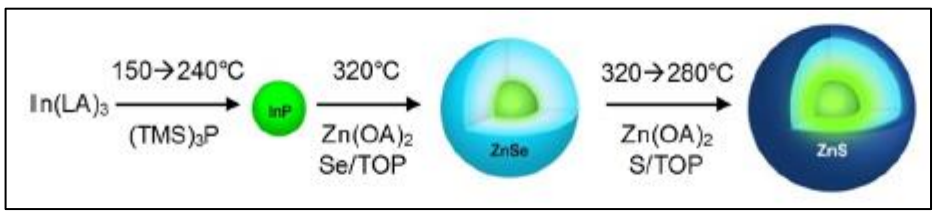
effecting conversion of the nanoparticle precursor into nanoparticles,	The method used to synthesize the Samsung Quantum Dots effects conversion of the nanoparticle precursor into nanoparticles. For example, upon information and belief, Samsung's Quantum Dots are formed using the following synthesis process, which converts a nanoparticle precursor composition to a material of the nanoparticles: **"We injected $(TMS)_3P$ at 150 °C in the presence of both indium laurate ($In(LA)_3$) and zinc oleate ($Zn(OA)_2$) precursors. At this mild temperature the In − P − Zn ligand complexes were first formed, and then they were converted to InP MSCs as the temperature increased to 170 °C, showing a sharp absorption peak at 370 nm."** *See e.g.*, "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics) (Exhibit 13), at 1497.   *Id., see also e.g.* "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics), Supporting Information (Exhibit 14) at S-3. Samsung's Quantum Dot synthesis process demonstrates that, at least, $In(LA)_3$ and $(TMS)_3P$ are precursor species comprised of ions contained in Samsung's resulting Quantum Dot nanoparticle core. *Id.* Samsung also demonstrates that a molecular interface exists between In, P, Zn, F, and S within their Quantum Dot cores, which means that precursor species containing, at least, In, P, Zn, and S are used in the synthesis process.

"effecting conversion of the nanoparticle precursor into nanoparticles,"

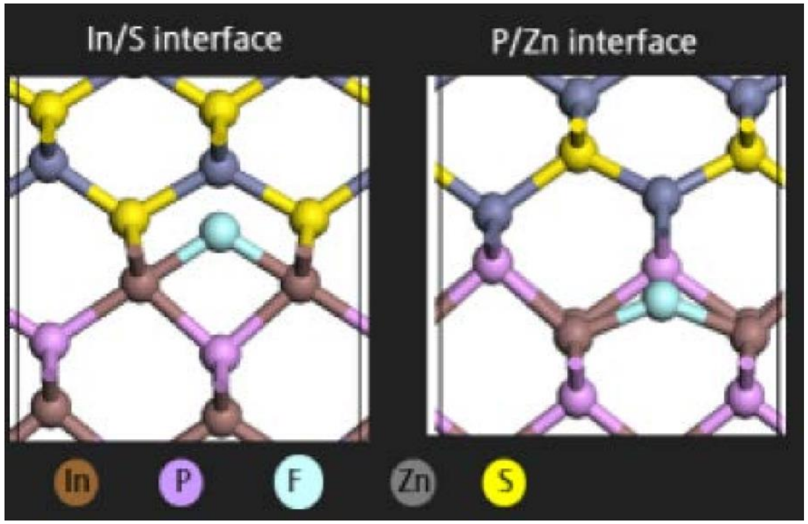


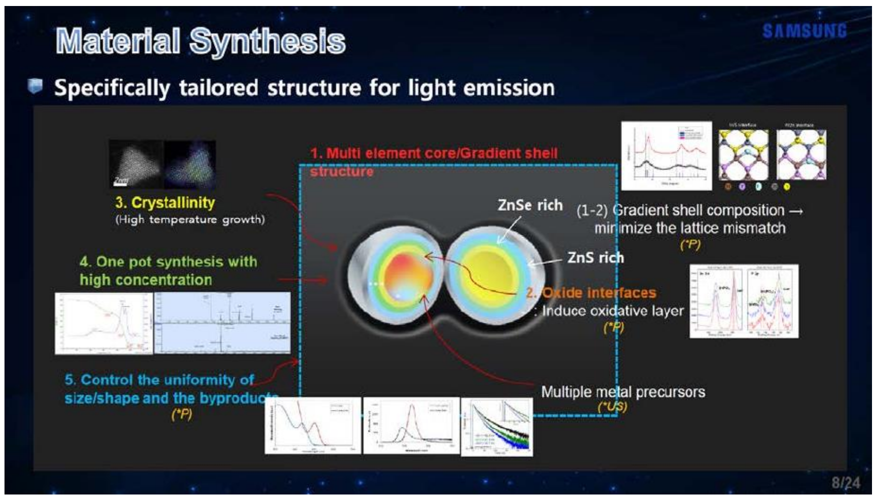


See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.

wherein said conversion is effected in the presence of a molecular cluster compound incorporating group 12 ions and group 16 ions under conditions permitting nanoparticle seeding and growth.	The conversion in the method used to synthesize the Samsung Quantum Dots is effected in the presence of a molecular cluster compound incorporating group 12 ions and group 16 ions under conditions permitting nanoparticle seeding and growth. For example, Samsung's Quantum Dots are formed using the following synthesis process, which converts a nanoparticle precursor composition to a material of the nanoparticles: **"We injected $(TMS)_3P$ at 150 °C in the presence of both indium laurate $(In(LA)_3)$ and zinc oleate $(Zn(OA)_2)$ precursors. At this mild temperature the In − P − Zn ligand complexes were first formed, and then they were converted to InP MSCs as the temperature increased to 170 °C, showing a sharp absorption peak at 370 nm."** *See e.g.*, "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics) (Exhibit 13), at 1497.   *Id., see also e.g.*, "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics), Supporting Information (Exhibit 14) at S-3. The conversion is effected in the presence of a molecular cluster. For example, Samsung's Quantum Dot synthesis process demonstrates that, at least, $In(LA)_3$, $Zn(OA)_2$, and $(TMS)_3P$ are precursor species and a molecular cluster compound that are all different from each other and comprised of ions contained in Samsung's resulting Quantum Dot nanoparticle core. *Id.*

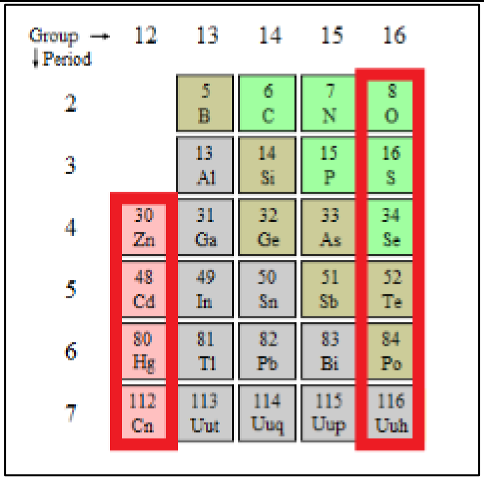
Samsung also demonstrates that a molecular interface exists between In, P, Zn, F, and S within their Quantum Dot cores, which means that precursor species and a molecular cluster compound containing, at least, In, P, Zn, and S are used in the synthesis process.





See e.g., "Environmentally Friendly Quantum Dots for Display Applications," Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 8.

S and O are ions from group 16 of the periodic table. Group 16 elements include: O, S, Se, Te, Po, and Uuh. Further, Zn is an ion from group 12 of the periodic table. Group 12 elements include: Zn, Cd, Hg, and Cn.



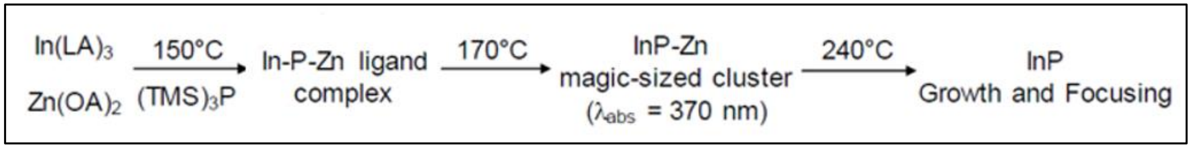
See e.g., https://www.jobilize.com/nanotechnology/course/optical-properties-of-group-12-16-ii-vi-semiconductor-nanoparticles.

The conversion is effected under conditions permitting seeding and growth of nanoparticles. For example, Samsung's Quantum Dots are formed using the following synthesis process:

"During the InP synthesis, unlike the LaMer type growth, it has been known that the initial nucleation phase completely consumes the highly reactive P precursor such as (TMS)3P, and further growth takes place through the Ostwald ripening, which results in a large size distribution."

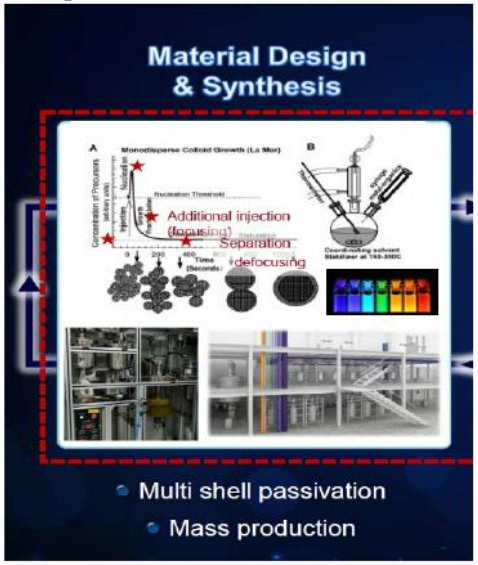
"We injected (TMS)3P at 150 °C in the presence of both indium laurate (In(LA)3) and zinc oleate (Zn(OA)2) precursors. At this mild temperature the In − P − Zn ligand complexes were first formed, and then they were converted to InP MSCs as the temperature increased to 170 °C, showing a sharp absorption peak at 370 nm."

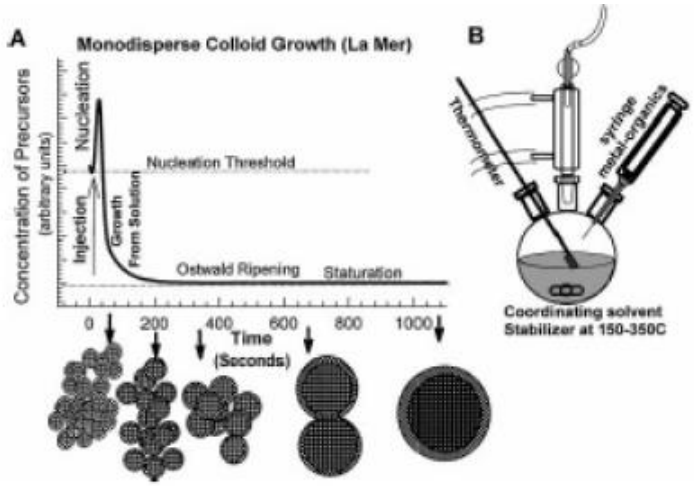
See e.g., "Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays," ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics) (Exhibit 13), at 1497.



Id., *see also e.g.*, “Bright and Uniform Green Light Emitting InP/ZnSe/ZnS Quantum Dots for Wide Color Gamut Displays,” ACS Appl. Nano Mater. 2019, 2, 1496−1504, Eunjoo Jang et. al. (Samsung Advanced Institute of Technology, Samsung Electronics), Supporting Information (Exhibit 14) at S-3.

Further, Samsung discloses its material design and synthesis process which permits seeding and growth of nanoparticles.





See e.g., “Environmentally Friendly Quantum Dots for Display Applications,” Eunjoo Jang (Samsung Advanced Institute of Technology, Samsung Electronics), Quantum Dot Forum 2018 Presentation (Exhibit 12) at Slide 13.